Response to Amendment

This Office Action is responsive to the amendment filed on 3/17/2011. Claims 1-8 are pending. Applicant's arguments have been considered and are persuasive. Claims 1-8 are finally rejected for reasons stated herein below.

The 35 USC 112, 2nd rejection has been withdrawn in light of the amendment.

35 USC § 112, 6th paragraph

It is noted that the language "means for determining a risk of freezing..." and "control means that is configured to forbid intermittent operation..." in claim 6 invokes 35 USC 112, 6th paragraph. The corresponding structure can be found in the instant Specification page 11, last paragraph.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 7, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schell (US 6593671) in view of Mufford (US 6186254), Wheat (US 6727013).

Schell discloses a control device that controls a fuel cell system to operate intermittently by switching between a power generation state and a power generation stop state of a fuel cell. See Abstract.

Schell does not disclose the control device is configured to:

determine whether to stop power generation operation during intermittent operation based on at least a temperature of a specific component that is external to the fuel cell and that contains moisture, from among a plurality of components constituting the fuel cell system while operation of the fuel cell system is being carried out, and to continue the power generation state when it is determined not to stop power generation.

Mufford teaches a resistor that functions as a block heater that <u>prevents the fuel cell stack from freezing</u> and facilitates start-up in cold weather. Fuel cell power from the fuel cell stack may also be used to supply electricity to the resistor. Fuel cell power may be advantageously used to power the resistor soon after start-up to bring the cell stack within the preferred operating temperature range and <u>during operating</u> to improve fuel cell performance by <u>maintaining the fuel cell stack within the preferred temperature range especially when the motor vehicle is operated in cool ambient temperatures</u> (4:35-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to add a resistor to Schell's fuel cell and continue to operate the fuel cell should the ambient temperature be cool ambient temperatures, as taught by Mufford, for the benefit of preventing the fuel cell from getting too cold and freezing.

Schell modified by Mufford does not disclose a means for determining a risk of freezing of a specific component that is external to the fuel cell and that contains

moisture, from among a plurality of components constituting the fuel cell system. Mufford teaches water as a cooling medium to regulate the fuel cell temperature (2:5-20). Mufford has a water tank 175 (fig. 1). Wheat discloses of measuring the temperature of the stack, the ambient temperature, and the water tank temperature to determine if heating is necessary to prevent freezing of the fuel cell (3:25-32). It would have been obvious to one of ordinary skill in the art at the time the invention was add Mufford's water tank to Schell's fuel cell system to regulate the temperature of the fuel cell stack. It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the temperature of the water tank, as taught by Wheat, to heat the fuel cell stack for the benefit of preventing freezing.

Schell modified by Mufford, Wheat would be functioning wherein "the temperature of the specific component is measured while the operation of the fuel cell system is being carried out" because the resistor would be powered during fuel cell operation.

Regarding claim 2, the water tank 175 of Mufford is a passage arranged on a flow path for fuel and oxidant 180 and 185 (fig. 1).

Regarding claim 3, the temperature of the specific component is measured directly by a temperature sensor provided corresponding to the water tank.

Regarding claim 4, the temperature of the specific component is measured indirectly based on the external air temperature because the ambient air affects the water tank temperature.

Regarding claim 5, "when it is determined to not stop, the power generation state of the fuel cell system is controlled so that the measured temperature exceeds a threshold value", Mufford teaches that the fuel cell is operated at a preferred temperature range to prevent freezing of the fuel cell, and thus the fuel cell is controlled to exceed the temperature of freezing (Applicant's threshold value).

Regarding claim 7, Schell discloses a fuel cell system comprising,

an electricity storage device that stores electrical power generated by a fuel cell, the electrical storage device serving as a first electrical power supply source to a consumption device which consumes electrical power, the fuel cell serving as a second electrical power supply source to the consumption device which consumes electrical power (2:30-55).

Regarding claim 8, Schell discloses a fuel cell/battery vehicle wiring system. It would have been obvious to one of ordinary skill of art at the time the invention was made to use the fuel cell system of Schell modified by Mufford and Wheat in the hybrid vehicle for the benefit of providing power in a hybrid vehicle.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pearson (US 6555989) in view of Mufford (US 6186254) and Wheat (US 6727013).

Pearson discloses a fuel cell system having a control device that controls the fuel cell system to operate intermittently by switching between a power generation state and a power generation stop state of a fuel cell. (6:21-36) Pearson discloses when main power source 2 is operating normally and storage battery 7 is in a fully charged

state, switch 51 connects main power source 2 to external load 3 (as shown). The fuel cell side of the system, including fuel cell stack 5 and reactant supply subsystem 10, is not required therefore and is off. However, the state-of-charge of battery 7 is continuously determined by charge controller 61. Information on battery voltage may be obtained from charge equalization system 71 and information on charge passed may be obtained by integrating the current measured by ammeter 59. Trickle charging may be provided to battery 7 by mains charging system 73 as per signal 67 from charge controller 61. Charge equalization system 71 may be operated continuously to equalize the state-of-charge of individual cells in battery 7.

(6:37-50) When a problem arises with main power source 2, it is detected by power detection module 76 and then run signals 79 are provided to runswitch 83 and inverter 45. Phase synchronization signal 81 is also provided to inverter 45. In turn, inverter 45 sends signal 53 to operate switch 51 such that power is directed from storage battery 7, through inverter 45, to external load 3. When runswitch 83 receives a run signal from either signal 79 or 85, it sends a run signal 30 to reactant supply subsystem 10. Subsystem 10 then goes through a warm up sequence and starts to supply processed reactants to fuel cell stack 5. The power needed to operate subsystem 10 and certain other devices may also be obtained from battery 7 or inverter 45 but is not shown in the schematic of FIG. 1.

(6:51-58) The demand on the fuel cell side of the system is determined by summing the current demanded from external load 3 and the current required to appropriately recharge storage battery 7. These currents are measured by load

ammeter 57 and battery ammeter 59 respectively with representative signals 67 and 69 being sent to computing unit 63. Signal 31, representing the summed current, is then provided to reactant supply subsystem 10.

(6:59-65) Subsystem 10 then is directed to process and provide reactants to meet the demand represented by signal 31. However, there is a delay in the time it takes for compressor 18 and particularly for reformer subsystem 16 to produce the desired reactants. Flowmeter 20 therefore determines the actual production rate of hydrogen and, from that, a desired current to be drawn from fuel cell stack 5 (provided by signal 23 to a setpoint input of DC-DC current converter 21).

(7:36-38) Once battery 7 is fully charged, the fuel cell side of the system is signaled to shutdown.

Pearson does not disclose control means that is configured to forbid intermittent operation when it is determined that the risk of freezing is high, wherein the means for determining determines the risk of freezing while the operation of the fuel cell system is being carried out. Mufford teaches a resistor that functions as a block heater that prevents the fuel cell stack from freezing and facilitates start-up in cold weather. Fuel cell power from the fuel cell stack may also be used to supply electricity to the resistor. Fuel cell power may be advantageously used to power the resistor soon after start-up to bring the cell stack within the preferred operating temperature range and during operating to improve fuel cell performance by maintaining the fuel cell stack within the preferred temperature range especially when the motor vehicle is operated in cool ambient temperatures (4:35-45). It would have been obvious to one of ordinary skill in

the art at the time the invention was made to add a resistor to Pearson's fuel cell and continue to operate the fuel cell should the ambient temperature be cool ambient temperatures, as taught by Mufford, for the benefit of preventing the fuel cell from getting too cold and freezing.

Pearson modified by Mufford does not disclose a means for determining a risk of freezing of a specific component that is external to the fuel cell and that contains moisture, from among a plurality of components constituting the fuel cell system. Mufford teaches water as a cooling medium to regulate the fuel cell temperature (2:5-20). Mufford has a water tank 175 (fig. 1). Wheat discloses of measuring the temperature of the stack, the ambient temperature, and the water tank temperature to determine if heating is necessary to prevent freezing of the fuel cell (3:25-32). It would have been obvious to one of ordinary skill in the art at the time the invention was add Mufford's water tank to Pearson's fuel cell system to regulate the temperature of the fuel cell stack. It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the temperature of the water tank, as taught by Wheat, to heat the fuel cell stack for the benefit of preventing freezing.

Response to Arguments

Applicant's arguments filed 7/26/2010 regarding Pearson have been considered but are moot in view of the new ground(s) of rejection.

It is noted that Mufford teaches the forbidding of switching from power gen state to power gen stop state because the fuel cell would continue to operate until the fuel cell operating temperature is in a preferred range.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CYNTHIA LEE whose telephone number is (571)272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-12922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Cynthia Lee/
Primary Examiner, Art Unit 1726